



Listing of Claims

1. (Currently Amended) A processor implemented data processing method comprising:

identifying a first plurality of ~~regions~~areas defined by a first corresponding plurality of geometric primitives disposed within a first innermost nested level of a first recursively partitioned/nested geometric structure having at least the first plurality of geometric primitives and a first other geometric primitive disposed in a first immediately preceding outer nesting level of the first innermost nested level, with the first plurality of areas defined by the first plurality of geometric primitives nested within a first other area defined by the first other geometric primitive, the first plurality of ~~regions~~areas that corresponding to a first plurality of normalized multi-dimensional data of a first normalized multi-dimensional data space, and the first recursively partitioned/nested geometric structure being corresponding to the first normalized multi-dimensional data space;

determining corresponding first graphing values for said first corresponding ~~region~~areas within said first recursively partitioned/nested geometric structure determined for said first normalized multi-dimensional data of said first normalized multi-dimensional data space;

associating corresponding first visual attributes with said first corresponding ~~region~~areas within said first recursively partitioned/nested geometric structure, based at least in part on corresponding ones of said determined first graphing values; and

displaying said first recursively partitioned/nested geometric structure, visually differentiating said first corresponding ~~region~~areas based at least in part on corresponding ones of said associated first visual attributes;

~~wherein said associating comprises for each of said first regions, associating a selected one of a plurality of colored geometric primitives with the region based at least in part on the determined graphing value of the region.~~

2. (Currently Amended) The method of claim 1, wherein each of said first normalized multi-dimensional data of said first normalized multi-dimensional data space comprises a plurality of relative coordinate values, and the method further comprises constructing a polynary string to represent each of said first normalized multi-dimensional data and its corresponding one of said first ~~region~~areas within said first recursively partitioned/nested geometric structure in accordance with the relative coordinate values.

3. (Currently Amended) The method of claim 2, wherein said constructing of a polynary string to represent each of said first normalized multi-dimensional data and its corresponding one of said first ~~region~~areas within said first recursively partitioned/nested geometric structure in accordance with the relative coordinate values comprises selecting a symbol as the next symbolic member of the polynary string based on which of the relative coordinate values is the current highest relative coordinate value.

4. (Currently Amended) The method of claim 3, wherein said constructing of a polynary string to represent each of said first normalized multi-dimensional data and its corresponding one of said first ~~region~~areas within said first recursively partitioned/nested geometric structure in accordance with the relative coordinate values further comprises reducing the highest relative coordinate value in by an amount (G), upon each selection, and reducing the amount (G) after each reduction.

1 5. (Original) The method of claim 4, wherein the amount (G) initially equals $1 -$
2 F , and thereafter reduced each time by $G \cdot (1 - F)$, where F equals $(n - 1)/n$, and n
3 equals the number of relative coordinate values.

1 6. (Currently Amended) The method of claim 2, wherein said determining of
2 corresponding first graphic values comprises determining frequencies of occurrence
3 of the various polynary strings of said first normalized multi-dimensional data, and
4 assigning the determined frequencies of occurrence to the corresponding first
5 ~~region~~areas within the first recursively partitioned/nested geometric structure as the
6 determined first graphing values of the corresponding first ~~region~~areas.

1 7. (Currently Amended) The method of claim 1, wherein said determining of
2 corresponding first graphic values comprises assigning first output values
3 corresponding to the first normalized multi-dimensional data as the determined first
4 graphing values of the corresponding first ~~region~~areas within the first recursively
5 partitioned/nested geometric structure.

1 8. (Original) The method of claim 7, wherein said determining of corresponding
2 first graphic values further comprises computing said first output values.

1 9. (Original) The method of claim 8, wherein each of said first normalized multi-
2 dimensional data of said first normalized multi-dimensional data space comprises a
3 polynary string having a plurality of symbols, encoding a plurality of relative
4 coordinate values, and said computing of the first output values comprises
5 for each constituting symbols of a polynary string, summing one or more
6 appearance values corresponding to one or more appearances of the particular

7 symbol in the polynary string, and adding the sum to an average residual relative
8 coordinate value.

1 10. (Original) The method of claim 9, wherein each appearance value
2 corresponding to an appearance of a particular symbol is dependent on the position
3 of the particular appearance of the particular symbol in the polynary string.

1 11. (Original) The method of claim 10, wherein each appearance value
2 corresponding to an appearance of a particular symbol is equal to a positional value
3 associated with the position of the particular appearance in the polynary string.

1 12. (Original) The method of claim 11, wherein
2 each positional value equals to $(1 - F) \times F^{(k - 1)}$, and
3 the average residual relative coordinate value equals $(1 - F) \times F^K$,
4 where F equals $(n - 1)/n$,
5 k denotes a position in a polynary string,
6 n equals the number of relative coordinate values, and
7 K equals the length of the polynary string.

1 13. (Currently Amended) The method of claim 2, wherein the method further
2 comprises
3 receiving a first zooming specification comprising one or more of said
4 polynary string constituting symbols;
5 | excluding a first subset of said first ~~region~~areas based at least in part on said
6 received first zooming specification; and
7 | repeating said displaying for the remaining ones of said first ~~region~~areas in an
8 expanded manner.

1 14. (Currently Amended) The method of claim 13, wherein the method further
2 comprises
3 receiving a second zooming specification comprising one or more additional
4 ones of said polynary string constituting symbols;
5 | excluding a second subset of said remaining ones of said first ~~region~~areas
6 based at least in part on said received second zooming specification; and
7 | repeating said displaying for the remaining ones of said first ~~region~~areas.

1 15. (Currently Amended) The method of claim 14, wherein the method further
2 comprises
3 receiving an unzoom specification;
4 | restoring the remaining ones of said first ~~region~~areas to re-include said
5 excluded second subset of said first ~~region~~areas; and
6 | repeating said displaying for the remaining ones of said first ~~region~~areas.

1 16. (Currently Amended) The method of claim 13, wherein the method further
2 comprises
3 receiving an unzoom specification;
4 | restoring the remaining ones of said first ~~region~~areas to re-include said
5 excluded first subset of said first ~~region~~areas; and
6 | repeating said displaying for said first ~~region~~areas.

1 17. (Currently Amended) The method of claim 1, wherein said associating
2 | comprises for each of said first ~~region~~areas, associating a selected one of a plurality
3 of symbols with the ~~region~~area based at least in part on the determined graphing
4 | value of the ~~region~~area.

1 18. (Currently Amended) The method of claim 1, wherein said associating
2 comprises for each of said first ~~region~~areas, associating a selected one of a plurality
3 of color attributes with the ~~region~~area based at least in part on the determined
4 graphing value of the ~~region~~area.

1 19. (Cancelled)

1 20. (Currently Amended) The method of claim 1, wherein said associating
2 comprises for each of said first ~~region~~areas, associating a selected blending of a
3 plurality of colors with the ~~region~~area based at least in part on contributions to the
4 determined graphing value of the ~~region~~area.

1 21. (Currently Amended) The method of claim 1, wherein said first ~~region~~areas
2 correspond to all constituting ~~region~~areas of the first recursively partitioned/nested
3 geometric structure, said first normalized multi-dimensional data are values of
4 independent variables of a function, and said first graphing values are
5 corresponding values of a dependent variable of the function.

1 22. (Currently Amended) The method of claim 1, wherein the method further
2 comprises
3 identifying a second plurality of ~~region~~areas defined by a second plurality of
4 geometric primitives disposed within a second innermost nested level of a second
5 recursively partitioned/nested geometric structure having at least the second
6 plurality of geometric primitives and a second other geometric primitive disposed in
7 a second immediately preceding outer nesting level of the second innermost nested
8 level, with the second plurality of areas defined by the second plurality of geometric

9 | primitives nested within a second other area defined by the second other geometric
10 | primitive, the second plurality of ~~region~~areas that corresponding to a second plurality
11 | of normalized multi-dimensional data of a second normalized multi-dimensional data
12 | space, and the second recursively partitioned/nested geometric structure ~~being~~
13 | corresponding to the second normalized multi-dimensional data space;
14 | determining corresponding second graphing values for said second
15 | corresponding ~~region~~areas within said second recursively partitioned/nested
16 | geometric structure determined for said second normalized multi-dimensional data
17 | of said second normalized multi-dimensional data space;
18 | associating corresponding second visual attributes with said second
19 | corresponding ~~region~~areas within said second recursively partitioned/nested
20 | geometric structure, based at least in part on corresponding ones of said
21 | determined second graphing values; and
22 | displaying said second recursively partitioned/nested geometric structure,
23 | visually differentiating said second corresponding ~~region~~areas based at least in part
24 | on corresponding ones of said associated second visual attributes.

1 | 23. (Original) The method of claim 22, wherein said first and second recursively
2 | partitioned/nested geometric structures are displayed in a manner such that both
3 | recursively partitioned/nested geometric structures are visible concurrently.

1 | 24. (Original) The method of claim 23, wherein each of said first and second
2 | normalized multi-dimensional data of said first and second normalized multi-
3 | dimensional data spaces comprises a polynary string having a plurality of symbols,
4 | encoding a plurality of relative coordinate values, the method further comprises
5 | receiving a first zooming specification comprising one or more of said
6 | polynary string constituting symbols;

7 excluding a first subset of said first ~~region~~areas based at least in part on said
8 received first zooming specification;
9 excluding a second subset of said second ~~region~~areas based at least part on
10 the removed ones of said first ~~region~~areas; and
11 repeating said displaying for the remaining ones of said first and second
12 ~~region~~areas.

1 25. (Original) The method of claim 22, wherein said first and second normalized
2 multi-dimensional data are values of first and second input variables.

1 26. (Original) The method of claim 22, wherein said first normalized multi-
2 dimensional data are values of input variables, and said second normalized multi-
3 dimensional data are values of corresponding output variables.

1 27. (Original) The method of claim 1, wherein the method further comprises
2 computing a location for a centroid for each of a plurality primitive elements of the
3 geometric structure.

1 28. (Original) The method of claim 27, wherein coordinates (x_p , y_p) of the location
2 of each centroid is computed as follows:

$$X_p = X_c + R * \sum_{k=1}^K V(N, k) * C(N, m[Lk])$$

$$Y_p = Y_c + R * \sum_{k=1}^K V(N, k) * S(N, m[Lk])$$

5 where:

6 (X_c , Y_c) are coordinate values of the geometric structure's centroid;

7 R is a radius extending from the geometric structure's centroid to an

8 outermost vertex of the geometric structure;

9 $V(N, k)$ is $w \cdot (1 - w)^{k-1}$ where $w = 1/(1 + \sin(\pi/N))$;
 10 $m[L_k]$ is outer vertex number (1, 2, ..., N) assigned to the k th symbol
 11 appearing in a corresponding polynary string;
 12 $C(N, m[L_k]) = \cos(a \cdot \pi)$; and
 13 $S(N, m[L_k]) = \sin(a \cdot \pi)$ [where $a = (5 \cdot N - 4 \cdot m[L_k]) / (2 \cdot N)$].

1 29. (Original) The method of claim 28, wherein the K values of $V(N, k)$ are
 2 computed once responsive to a specification of N .

1 30. (Original) The method of claim 28, wherein at least the N values of $C(N,$
 2 $m[L_k])$ or the N values of $S(N, m[L_k])$ are computed once responsive to a
 3 specification of N .

1 31. (Withdrawn) A processor implemented data processing method for
 2 generating a polynary string representation for an entity defined by n relative
 3 coordinate values, n being an integer, comprising:
 4 associating n symbolic representations with said n relative coordinate values;
 5 and
 6 selecting the symbolic representation corresponding to the highest relative
 7 coordinate value as the first constituting member of the polynary string
 8 representation.

1 32. (Withdrawn) The method of claim 31, wherein the method further comprises
 2 computing a constant value (F) by dividing $(n - 1)$ by n ; and
 3 computing a variable value (G) by subtracting F from 1;

4 subtracting G from the current highest relative coordinate value; and
5 selecting the symbolic representation corresponding to the current highest
6 relative coordinate value as the next constituting member of the polynary string
7 representation.

1 33. (Withdrawn) The method of claim 32, wherein the method further comprises
2 multiplying the current value of G by F;
3 subtracting G from the current highest relative coordinate value; and
4 selecting the symbolic representation corresponding to the current highest
5 relative coordinate value as the next constituting member of the polynary string
6 representation.

1 34. (Withdrawn) The method of claim 33, wherein the method further comprises
2 repeating said multiply, subtracting and selecting operations set forth in claim 29.

1 35. (Withdrawn) The method of claim 31, wherein said symbolic representation
2 comprises a letter.

1 36. (Withdrawn) The method of claim 31, wherein said symbolic representation
2 comprises a special character.

1 37. (Withdrawn) A processor implemented data processing method for
2 generating a relative coordinate value for an constituting variable of an entity, the
3 entity being represented by a polynary string representation having a plurality of
4 symbolic members representing the constituting variables, the method comprising:
5 determining appearance positions of appearance instances of the symbolic
6 members in said polynary string representation;

7 summing positional values corresponding to the appearance instances of the
8 symbolic members in said polynary string representation; and
9 adding the sum to an average residual relative coordinate value.

1 38. (Withdrawn) The method of claim 37, wherein
2 each positional value equals to $(1 - F) \times F^{**}(k - 1)$, and
3 the average residual relative coordinate value equals $(1 - F) \times F^{**}K$,
4 where F equals $(n - 1)/n$,
5 n equals the number of coordinate values,
6 k denotes a position in the polynary string representation; and
7 K equals the length of the polynary string.

1 39. (Currently Amended) An apparatus comprising:
2 storage medium having stored therein programming instructions designed to
3 enable the apparatus to
4 identify a first plurality of ~~region~~areas defined by a first plurality of
5 geometric primitives disposed within a first innermost nested level of a
6 first recursively partitioned/nested geometric structure having the first
7 plurality of geometric primitives and a first other geometric primitive
8 disposed in a first immediately preceding outer nesting level of the first
9 innermost nested level, with the first plurality of areas of the first
10 plurality of geometric primitives nested within a first other area defined
11 by the first other geometric primitive, the first plurality of ~~region~~areas
12 ~~that corresponding~~ to a first plurality of normalized multi-dimensional
13 data of a first normalized multi-dimensional data space, and the first
14 recursively partitioned/nested geometric structure ~~being corresponding~~
15 to the first normalized multi-dimensional data space,

16 determine corresponding first graphing values for said first corresponding
17 ~~region~~areas within said first recursively partitioned/nested geometric
18 structure determined for said first normalized multi-dimensional data of
19 said first normalized multi-dimensional data space;
20 associate corresponding first visual attributes with said first corresponding
21 ~~region~~areas within said first recursively partitioned/nested geometric
22 structure, based at least in part on corresponding ones of said
23 determined first graphing values, ~~including associating for each of said~~
24 ~~first regions a selected one of a plurality of colored geometric~~
25 ~~primitives with the region based at least in part on the determined~~
26 ~~graphing value of the region, and~~
27 display said first recursively partitioned/nested geometric structure,
28 visually differentiating said first corresponding ~~region~~areas based at
29 least in part on corresponding ones of said associated first visual
30 attributes; and
31 at least one processor coupled to the storage medium to execute the
32 programming instructions.

1 40. (Currently Amended) The apparatus of claim 39, wherein each of said first
2 normalized multi-dimensional data of said first normalized multi-dimensional data
3 space comprises a plurality of relative coordinate values, and the programming
4 instructions are further designed to enable the apparatus to construct a polynary
5 string to represent each of said first normalized multi-dimensional data and its
6 corresponding one of said first ~~region~~areas within said first recursively
7 partitioned/nested geometric structure in accordance with the relative coordinate
8 values.

1 41. (Original) The apparatus of claim 40, wherein said programming instructions
2 are designed to enable the apparatus to perform said constructing of a polynary
3 string by selecting a symbol as the next symbolic member of the polynary string
4 based on which of the relative coordinate values is the current highest relative
5 coordinate value.

1 42. (Original) The apparatus of claim 41, wherein said programming instructions
2 are further designed to enable the apparatus to perform said constructing of a
3 polynary string by reducing the highest relative coordinate value in by an amount
4 (G), upon each selection, and reducing the amount (G) after each reduction.

1 43. (Original) The apparatus of claim 42, wherein said programming instructions
2 are designed to enable the apparatus to set the amount (G) initially to $1 - F$, and
3 thereafter reduced each time by $G \cdot (1 - F)$, where F equals $(n - 1)/n$, and n equals
4 the number of relative coordinate values.

1 44. (Currently Amended) The apparatus of claim 40, wherein said programming
2 instructions are designed to enable the apparatus to perform said determining by
3 determining frequencies of occurrence of the various polynary strings of said first
4 normalized multi-dimensional data, and assigning the determined frequencies of
5 occurrence to the corresponding first ~~region~~areas within the first recursively
6 partitioned/nested geometric structure as the determined first graphing values of the
7 corresponding first ~~region~~areas.

1 45. (Currently Amended) The apparatus of claim 39, wherein said programming
2 instructions are designed to enable the apparatus to perform said determining by
3 assigning first output values corresponding to the first normalized multi-dimensional

4 | data as the determined first graphing values of the corresponding first ~~region~~areas
5 within the first recursively partitioned/nested geometric structure.

1 46. (Original) The apparatus of claim 45, wherein said programming instructions
2 are further designed to enable the apparatus to perform said determining by
3 computing said first output values.

1 47. (Original) The apparatus of claim 46, wherein each of said first normalized
2 multi-dimensional data of said first normalized multi-dimensional data space
3 comprises a polynary string having a plurality of symbols, encoding a plurality of
4 relative coordinate values, and said programming instructions are designed to
5 enable the apparatus to perform said computing by
6 summing one or more appearance values corresponding to one or more
7 appearances of the particular symbol in a polynary string, and adding the sum to an
8 average residual relative coordinate value, and
9 repeating said summing and adding for each constituting symbols of the
10 polynary string.

1 48. (Original) The apparatus of claim 47, wherein each appearance value
2 corresponding to an appearance of a particular symbol is dependent on the position
3 of the particular appearance of the particular symbol in the polynary string.

1 49. (Original) The apparatus of claim 48, wherein each appearance value
2 corresponding to an appearance of a particular symbol is equal to a positional value
3 associated with the position of the particular appearance in the polynary string.

1 50. (Original) The apparatus of claim 49, wherein

2 each positional value equals to $(1 - F) \times F^{(k - 1)}$, and
3 the average residual relative coordinate value equals $(1 - F) \times F^{K}$,
4 where F equals $(n - 1)/n$,
5 k denotes a position in a polynary string,
6 n equals the number of relative coordinate values, and
7 K equals the length of the polynary string.

1 51. (Currently Amended) The apparatus of claim 40, wherein said programming
2 instructions are further designed to enable the apparatus to
3 receive a first zooming specification comprising one or more of said polynary
4 string constituting symbols;
5 | exclude a first subset of said first ~~region~~areas based at least in part on said
6 received first zooming specification; and
7 | repeat said displaying for the remaining ones of said first ~~region~~areas in an
8 expanded manner.

1 52. (Currently Amended) The apparatus of claim 51, wherein said programming
2 instructions are further designed to enable the apparatus to
3 receive a second zooming specification comprising one or more additional
4 ones of said polynary string constituting symbols;
5 | exclude a second subset of said remaining ones of said first ~~region~~areas
6 based at least in part on said received second zooming specification; and
7 | repeat said displaying for the remaining ones of said first ~~region~~areas.

1 53. (Currently Amended) The apparatus of claim 52, wherein said programming
2 instructions are designed to enable the apparatus to
3 receive an unzoom specification;

4 restore the remaining ones of said first ~~region~~areas to re-include said
5 excluded second subset of said first ~~region~~areas; and
6 repeat said displaying for the remaining ones of said first ~~region~~areas.

1 54. (Currently Amended) The apparatus of claim 51, wherein said programming
2 instructions are further designed to enable the apparatus to
3 receive an unzoom specification;
4 restore the remaining ones of said first ~~region~~areas to re-include said
5 excluded first subset of said first ~~region~~areas; and
6 repeat said displaying for said first ~~region~~areas.

1 55. (Currently Amended) The apparatus of claim 39, wherein said programming
2 instructions are designed to enable the apparatus to perform said associating by
3 associating, for each of said first ~~region~~areas, a selected one of a plurality of
4 symbols with the ~~region~~area based at least in part on the determined graphing value
5 of the ~~region~~area.

1 56. (Currently Amended) The apparatus of claim 39, wherein said programming
2 instructions are designed to enable the apparatus to perform said associating by
3 associating, for each of said first ~~region~~areas, a selected one of a plurality of color
4 attributes with the ~~region~~area based at least in part on the determined graphing
5 value of the ~~region~~area.

1 57. (Cancelled)

1 58. (Currently Amended) The apparatus of claim 39, wherein said programming
2 instructions are designed to enable the apparatus to perform said associating by

3 associating, for each of said first ~~region~~areas, a selected blending of a plurality of
4 colors with the ~~region~~area based at least in part on contributions to the determined
5 graphing value of the ~~region~~area.

1 59. (Currently Amended) The apparatus of claim 39, wherein said first
2 ~~region~~areas correspond to all constituting ~~region~~areas of the first recursively
3 partitioned/nested geometric structure, said first normalized multi-dimensional data
4 are values of independent variables of a function, and said first graphing values are
5 corresponding values of a dependent variable of the function.

1 60. (Currently Amended) The apparatus of claim 39, wherein said programming
2 instructions are further designed to enable the apparatus to
3 identify a second plurality of ~~region~~areas defined by a second plurality of
4 geometric primitives disposed within a second innermost nested level of a second
5 recursively partitioned/nested geometric structure having at least the second
6 plurality of geometric primitives and a second other geometric primitive disposed in
7 a second immediately preceding outer nesting level of the second innermost nested
8 level, with the second plurality of areas defined by the second plurality of geometric
9 primitives nested within a second other area defined by the second other geometric
10 primitive, the second plurality of ~~region~~areas that corresponding to a second plurality
11 of normalized multi-dimensional data of a second normalized multi-dimensional data
12 space, and the second recursively partitioned/nested geometric structure being
13 corresponding to the second normalized multi-dimensional data space;
14 determine corresponding second graphing values for said second
15 corresponding ~~region~~areas within said second recursively partitioned/nested
16 geometric structure determined for said second normalized multi-dimensional data
17 of said second normalized multi-dimensional data space;

18 associate corresponding second visual attributes with said second
19 | corresponding ~~region~~areas within said second recursively partitioned/nested
20 geometric structure, based at least in part on corresponding ones of said
21 determined second graphing values; and
22 display said second recursively partitioned/nested geometric structure,
23 | visually differentiating said second corresponding ~~region~~areas based at least in part
24 on corresponding ones of said associated second visual attributes.

1 61. (Original) The apparatus of claim 60, wherein said first and second
2 recursively partitioned/nested geometric structures are displayed in a manner such
3 that both recursively partitioned/nested geometric structures are visible concurrently.

1 62. (Currently Amended) The apparatus of claim 61, wherein each of said first
2 and second normalized multi-dimensional data of said first and second normalized
3 multi-dimensional data spaces comprises a polynary string having a plurality of
4 symbols, encoding a plurality of relative coordinate values, said programming
5 instructions are further designed to enable the apparatus to
6 receive a first zooming specification comprising one or more of said polynary
7 string constituting symbols;
8 | exclude a first subset of said first ~~region~~areas based at least in part on said
9 received first zooming specification;
10 | exclude a second subset of said second ~~region~~areas based at least part on
11 the removed ones of said first ~~region~~areas; and
12 repeat said displaying for the remaining ones of said first and second
13 | ~~region~~areas.

1 63. (Original) The apparatus of claim 60, wherein said first and second
2 normalized multi-dimensional data are values of first and second input variables.

1 64. (Original) The apparatus of claim 60, wherein said first normalized multi-
2 dimensional data are values of input variables, and said second normalized multi-
3 dimensional data are values of corresponding output variables.

1 65. (Original) The apparatus of claim 39, wherein said apparatus is a selected
2 one of a palm sized processor based device, a notebook computer, a desktop
3 computer, a set-top box, a single processor server, a multi-processor server, and a
4 collection of coupled servers.

1 66. (Previously presented) The apparatus of claim 39, wherein said programming
2 instructions are further designed to compute a location for a centroid for each of a
3 plurality of primitive elements of the geometric structure.

1 67. (Original) The apparatus of claim 66, wherein said programming instructions
2 are designed to compute coordinates (x_p , y_p) of the location of each centroid as
3 follows:

4
$$X_p = X_c + R * \sum_{k=1}^K V(N, k) * C(N, m[Lk])$$

5
$$Y_p = Y_c + R * \sum_{k=1}^K V(N, k) * S(N, m[Lk])$$

6 where:

7 (X_c , Y_c) are coordinate values of the geometric structure's centroid;

8 R is a radius extending from the geometric structure's centroid to an
9 outermost vertex of the geometric structure;

10 $V(N, k)$ is $w \cdot (1 - w)^{(k - 1)}$ where $w = 1/(1 + \sin(\pi/N))$;
 11 $m[L_k]$ is outer vertex number (1, 2, ..., N) assigned to the k th symbol
 12 appearing in a corresponding polynary string;
 13 $C(N, m[L_k]) = \cos(a \cdot \pi)$; and
 14 $S(N, m[L_k]) = \sin(a \cdot \pi)$ [where $a = (5 \cdot N - 4 \cdot m[L_k]) / (2 \cdot N)$].

1 68. (Original) The apparatus of claim 67, wherein said programming instructions
 2 are designed to compute the K values of $V(N, k)$ once responsive to a specification
 3 of N .

1 69. (Original) The method of claim 67, wherein said programming instructions are
 2 designed to compute at least the N values of $C(N, m[L_k])$ or the N values of $S(N,$
 3 $m[L_k])$ once responsive to a specification of N .

1 70. (Withdrawn) An apparatus comprising
 2 storage medium having stored therein programming instructions designed to
 3 enable the apparatus to
 4 associate n symbolic representations with said n relative coordinate
 5 values, and
 6 select the symbolic representation corresponding to the highest
 7 relative coordinate value as the first constituting member of the
 8 polynary string representation; and
 9 at least one processor coupled to the storage medium to execute the
 10 programming instructions.

1 71. (Withdrawn) The apparatus of claim 70, wherein the programming
2 instructions further enable the apparatus to
3 compute a constant value (F) by dividing $(n - 1)$ by n ; and
4 compute a variable value (G) by subtracting F from 1;
5 subtract G from the current highest relative coordinate value; and
6 select the symbolic representation corresponding to the current highest
7 relative coordinate value as the next constituting member of the polynary string
8 representation.

1 72. (Withdrawn) The apparatus of claim 71, wherein the programming
2 instructions further enable the apparatus to
3 multiply the current value of G by F;
4 subtract G from the current highest relative coordinate value; and
5 select the symbolic representation corresponding to the current highest
6 relative coordinate value as the next constituting member of the polynary string
7 representation.

1 73. (Withdrawn) The apparatus of claim 72, wherein the programming
2 instructions further enable the apparatus to repeat said multiply, subtracting and
3 selecting operations set forth in claim 64.

1 74. (Withdrawn) The apparatus of claim 70, wherein said symbolic representation
2 comprises a letter.

1 75. (Withdrawn) The apparatus of claim 70, wherein said symbolic representation
2 comprises a special character.

1 76. (Withdrawn) The apparatus of claim 70, wherein said apparatus is a selected
2 one of a palm sized processor based device, a notebook computer, a desktop
3 computer, a set-top box, a single processor server, a multi-processor server, and a
4 collection of coupled servers.

1 77. (Withdrawn) An apparatus comprising:
2 storage medium having stored therein a plurality of programming instructions
3 designed to enable the apparatus to
4 determine appearance positions of appearance instances of symbolic
5 members of a polynary string representation of an entity having a
6 number of constituting variables, the symbolic members being
7 corresponding to the constituting variables,
8 sum positional values corresponding to the appearance instances of the
9 symbolic members in said polynary string representation, and
10 add the sum to an average residual relative coordinate value; and
11 at least one processor coupled to the storage medium to execute the
12 programming instructions.

1 78. (Withdrawn) The apparatus of claim 77, wherein
2 each positional value equals to $(1 - F) \times F^{(k - 1)}$; and
3 the average residual relative coordinate value equals $(1 - F) \times F^K$,
4 where F equals $(n - 1)/n$,
5 n equals the number of coordinate values,
6 k denotes a position in the polynary string representation; and
7 K denotes the length of the polynary string.

1 79. (Withdrawn) The apparatus of claim 77, wherein said apparatus is a selected
2 one of a palm sized processor based device, a notebook computer, a desktop
3 computer, a set-top box, a single processor server, a multi-processor server, and a
4 collection of coupled servers.

5

1 80. (New) The method of claim 1, wherein the method further comprises
2 selecting the geometric primitives.

3

1 81. (New) The apparatus of claim 39, wherein the programming instructions are
2 further designed to enable the apparatus to select the geometric primitives.

3